22106

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 060 227**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 82830030.1

(22) Date of filing: 11.02.82

(51) Int. Cl.³: B 21 B 43/00
B 21 B 45/02

(30) Priority: 09.03.81 IT 8334081

(43) Date of publication of application:
15.09.82 Bulletin 82/37

(84) Designated Contracting States:
CH DE FR GB LI

(71) Applicant: DANIELI & C. OFFICINE MECCANICHE S.p.A.
Via Nazionale
I-33042 Buttrio(IT)

(72) Inventor: Matteazzi, Paolo
Via Cappuccini, 29
Schio (VI)(IT)

(72) Inventor: Facchini, Alessandro
Via De Paoli, 25
I-33170 Pordenone(IT)

(74) Representative: Petraz, Gilberto
G.L.P. S.a.s. di Gilberto Petraz P.le Cavedalis 6/2
I-33100 Udine(IT)

(54) Auxiliary cooling system with blown air for coils of hot-rolled metallic wire, and device to carry out said system.

(57) Cooling system with blown air for coils of hot-rolled metallic wire (11) borne on a cooling roller conveyor (12), said system being characterized by directing an additional stream of air towards the zones of greatest accumulation of the material near the edges of said roller conveyor (12), whereby said blowing of air is coordinated with the main blowing of cooling air from under said roller conveyor (12) and can be regulated as regards its strength and its orientation towards the zones of interest, and whereby the relative means to carry out said system consist of:

- at least one tubular conduit means (18) disposed lengthwise along said cooling roller conveyor (12) and connected to means delivering compressed air (20),
- a plurality of blower means (19-25), and
- anchorage means (21) for the conduit means (18), whereby said anchorage means (21) enable the orientation of the stream of air towards the coils in the zones of interest to be regulated.

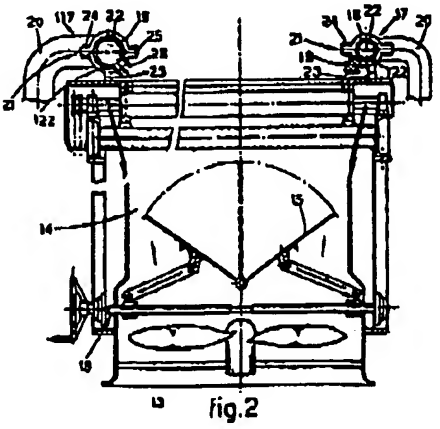

fig.2

EP 0 060 227 A2

Classe Int. n. B 21 B 43/00
B 21 D 11/06

nr. 00800227

Description of the invention entitled:
"AUXILIARY COOLING SYSTEM WITH BLOWN AIR FOR COILS OF HOT-ROLLED METALLIC WIRE, AND DEVICE TO CARRY OUT SAID SYSTEM"
in the name of DANIELI & C. OFF. MECC. S.p.A. at BUTTRIO
submitted on under No.

This invention concerns an additional cooling system with blown air for coils of hot-rolled metallic wire borne on a cooling roller conveyor and also concerns means able to carry out said system.

To be more exact, this invention concerns an auxiliary system to cool those parts of the metallic wire that lie near the edges of the roller conveyor which obtains cooling with blown air and which is located downstream from the head forming the coils, whereby said cooling is part of a known controlled process for cooling the wire as the latter leaves the hot-rolling mill train.

In the known processes for controlled cooling of hot-rolled wire, the wire is cooled in two stages.

The first stage is a strong water cooling process which takes place immediately after the last rolling stand, whereas the second stage follows the formation of coils carried out in the coiling means located downstream from said water cooling line.

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The second cooling stage is accomplished by blowing cold air from beneath the powered cooling roller conveyor on which the coils of wire leaving the coiling device are borne and partially superimposed on each other.

It is known that the coils deposited on the movable roller conveyor are partially superimposed on each other and are disordered to a certain extent in the direction of their forward movement and that therefore there is a thinning out of their layers in the middle of the roller conveyor, whereas there is a thickening of their layers at the edges of said roller conveyor.

This leads to stronger cooling of the parts of the coils lying in the middle of the roller conveyor and lesser cooling of the parts of the coils stacked on top of each other near the edges of the roller conveyor.

It is evident that this stacking is proportional to the distance from the middle of the roller conveyor and is greatest at the edges thereof.

It is also known that the cooling process is a thermal treatment which affects the micro-structure, and therefore the mechanical properties, of the wire, the formation of scale and also the uniformity and constancy of said properties throughout the whole length of the coiled wire.

The first two aspects have already been tackled and substantially overcome within their specific field.

The last aspect, namely the uniformity and constancy of the mechanical properties, has been made rather worse by the fact that the air blown from beneath the roller conveyor meets a greater mass of metal to be cooled at the sides than in the middle of said roller conveyor, the outcome being that the parts of the coils near the edges of the roller conveyor cool off more slowly and may therefore have mechanical properties which differ along the wire with variations which

are repeated in each coil.

So as to overcome this problem, baffle plates have been provided to deflect the stream of cooling air and are located below the roller conveyor, their task being to spread the air in proportion to the thickening of the layers of coils lying above.

This measure only overcomes the problem partially inasmuch as, while it lessens the disparity of cooling in the intermediate tracts between the middle and the edges, it does not alter the situation enough in the outermost tracts, since the passage of cooling air towards the upper layers of coils built up at the edges is reduced substantially because of the great density of coils.

The purpose of this invention, therefore, is to eliminate said problems.

A further purpose of this invention is to improve the second phase of the controlled cooling process.

Another purpose of the invention is to lessen the variations in mechanical properties along the wire.

One advantage of the invention is the elimination of further thermal treatments intended to improve the structure and therefore the mechanical properties and to reduce thereby the overall cost of the end product.

Another advantage lies in the fact that the system of this invention is applied to already existing roller conveyors.

The subject of this invention is embodied, therefore, in an additional cooling system with blown air, whereby said system affects the zones of greater accumulation of material near the edges of the roller conveyor by means of the prearrangement of means to blow cooling air along the edges of said roller conveyor, and whereby said blowing of air is coordinated with the main blowing of cooling air from beneath

the roller conveyor and can be regulated as regards its strength and orientation in the zones in question.

The device carrying out said additional cooling system according to the invention comprises at least one tubular conduit means which feeds the cooling air and which is arranged lengthwise near the edges of said cooling roller conveyor and also comprises a plurality of means which blow cooling air at an adjustable pressure and rate of flow and which are connected to said tubular conduit means, whereby for the tubular conduit means some anchorage means are envisaged which permit adjustment of the direction of flow of the air towards the coils to be cooled in the zones of interest.

We shall describe hereinafter, as a non-restrictive example, an embodiment of the invention and a variant thereto with the help of the table, wherein:

Fig.I shows a plan view of the cooling roller conveyor, which bears in this instance cooling systems according to both the preferential embodiment and the variant;

Fig.2 shows a cross section of the roller conveyor of Fig.I, wherein the system according to the preferential embodiment is set out on the righthand side, whereas the system according to the variant is set out on the lefthand side of the figure.

In Figs. I and 2 the same parts or parts performing the same functions bear the same reference numbers.

To simplify the drawing, Figs. I and 2 show together the preferential embodiment I7 and the variant II7 of the system of the invention; however, it is to be understood that according to the invention pairs of devices are fitted at the two edges of a roller conveyor and are constructed according to one or the other of the embodiments I7-II7

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which will be described separately hereinafter.

In Fig.I, IO indicates the device forming the coils II, which are laid continuously on the movable roller conveyor I2 on which the second cooling phase is carried out.

The main cooling is obtained from beneath the roller conveyor I2 by means of a cooling system consisting of a plurality of means delivering air, which here are blowers I3 fitted outside a box-like structure arranged below the roller conveyor I2.

Said structure has the shape of a channel with its base formed with adjustable baffle plate means I5, which regulate the flow of air coming from the delivery means I3 into the cooling channel I4, whereby the baffle plate means I5 can be adjusted with an opener device I6.

The cooling system I7 according to the invention is shown on the righthand side of Fig.2 and on the lower side of Fig.I and comprises at least one air cooling conduit means I8 stretching along the roller conveyor I2 in correspondence with each edge thereof and located at the side of said roller conveyor I2.

Said conduit means I8 comprises, in its side facing the coils to be cooled, a plurality of blower means I9.

Said conduit means I8 are fed with cooling air by feeder means 20 connected to said conduit means I8, as shown in Figs. I and 2.

Each of the blower means I9 consists, in this instance, of a nozzle of a suitable type with an opening which diverges advantageously so as to create a substantially conical air stream, but said blower means can be of another type or shape and can include means to regulate the flow of their output of air.

According to the preferential embodiment of the invention some anchorage means 2I are comprised which can uphold

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the conduit means I8.

Said anchorage means 2I consist here of rings formed by two half-rings 22-I22 which can be secured to each other, whereby one of said half-rings I22 is anchored in line with the structure of the roller conveyor I2 by means of the element 23.

The conduit means I8 are set on said stationary half-rings I22 and are clamped with the application of the other half-rings 22 by means of fixture means 24, which consist of threaded bolts passing through the half-rings 22 and screwed into the stationary half-rings I22.

When said fixture means 24 are unscrewed, it is possible to regulate as a whole the orientation of the group of blower means I9 by rotating the conduit means I8 inside the anchorage means 2I.

As soon as the blower means I9 have been oriented, the conduit means I8 are clamped in position by tightening the anchorage means 2I against them.

The upper edge of the roller conveyor I2 of Fig.I, which corresponds to the lefthand edge of Fig.2, shows a variant II7 of the cooling system of the invention.

According to this variant said cooling air conduit means I8, being connected to the means 20 feeding air, is equipped, on that side of itself facing the coils to be cooled, with a plurality of blower openings 25 from which comes the stream of cooling air, whereby said opening means 25 can be provided helpfully, but not necessarily, with baffle means 26 located outside on the edges of said opening means 25 with the task of forming an even flow of cooling air directed towards the band of coils requiring said flow for cooling purposes.

According to another variant said plurality of lengthwise blower openings 25 is united, one with another, so as

to form one single opening through which the stream of cooling air comes out along said lengthwise conduit means I8.

In this variant too it is possible to regulate the direction of the flow of air since anchorage means 22 and fixture means 24 are envisaged which are substantially like those described earlier with regard to the preferential embodiment.

Said baffle plate means 26 can be regulated helpfully in relation to the conduit means I8 since said baffle plate means I8 can be hinged on the relative edges of the lengthwise opening means 25.

We have given a preferential description here, but other variants are possible.

For instance, it is possible to envisage the use of more conduit means I8 or II7 located at the side of each edge of the roller conveyor I2.

It is also possible to envisage a conduit means I8 located in the middle of and above the roller conveyor I2 with a series of blower means I9 or opening means 25 directed towards the coils in the zones of the two edges of said roller conveyor I2.

It is possible to envisage that the blower nozzle means I9 can be swivelled in relation to the conduit means I8.

It is possible to visualize different means for feeding cooling air. It is also possible to vary the shapes, sizes and proportions, all of this being possible for a technician in this field without departing thereby from the scope of the inventive idea of the invention.

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CLAIMS

1. Cooling system with blown air for coils of hot-rolled metallic wire(II) borne on a cooling roller conveyor (I2), said system being characterized by directing an additional stream of air towards the zones of greatest accumulation of material near the edges of said roller conveyor (I2),whereby the blowing of said air is coordinated with the main blowing of cooling air from underneath the roller conveyor (I2) and can be regulated as regards its strength and its orientation towards the zones of interest.

2. Cooling device with blown air for coils of hot-rolled metallic wire (II) borne on a cooling roller conveyor (I2), said device being characterized by including in mutual coordination and cooperation:

- at least one tubular conduit means (I8) that feeds cooling air and is disposed lengthwise near the edges of said cooling roller conveyor (I2) and is connected to means (20) delivering compressed air,
- a plurality of means (I9-25) blowing cooling air at an adjustable pressure and rate of flow, said blower means (I9-25) being anchored to and fed by said conduit means (I8), and
- anchorage means (2I) which secure said conduit means (I8) and enable the orientation of the stream of air to be adjusted towards the coils in the zones of interest.

3. Cooling device as in Claim I, characterized by the fact that said blower means consist of a plurality of air sprayers (I9) fitted to said conduit means (I8) on the side thereof which faces the coils to be cooled.

4. Device as in Claims 2 and 3, characterized by the fact that said sprayers (I9) are fitted so as to be able to be swivelled in relation to said conduit means (I8).

5. Device as in Claim 2, characterized by the fact that said blower means consist of a plurality of blower holes (25) located along said conduit means (I8) and opening out near the coils to be cooled.

6. Device as in Claim 2, characterized by the fact that said blower means consist of one single lengthwise hole (25) provided along said conduit means (I8) and opening out near the coils to be cooled.

7. Device as in Claim 2 and in one or another of the Claims thereafter, characterized by the fact that said anchorage means (2I) consist of a plurality of rings, each composed of two equal half-rings (22-I22) which can be clamped together by clamping means (24), whereby one of said half-rings (I22) is solidly fixed to the channel section of the cooling roller conveyor (I2).

8. Device as in Claim 6, characterized by the fact that said clamping means consist of threaded securing bolts (24) screwed into the stationary half-rings (I22).

9. Cooling system with blown air for coils of hot-rolled metallic wire, and device to carry out said system, being substantially as described, claimed and shown and for the purposes granted.

Gilberto Petraz

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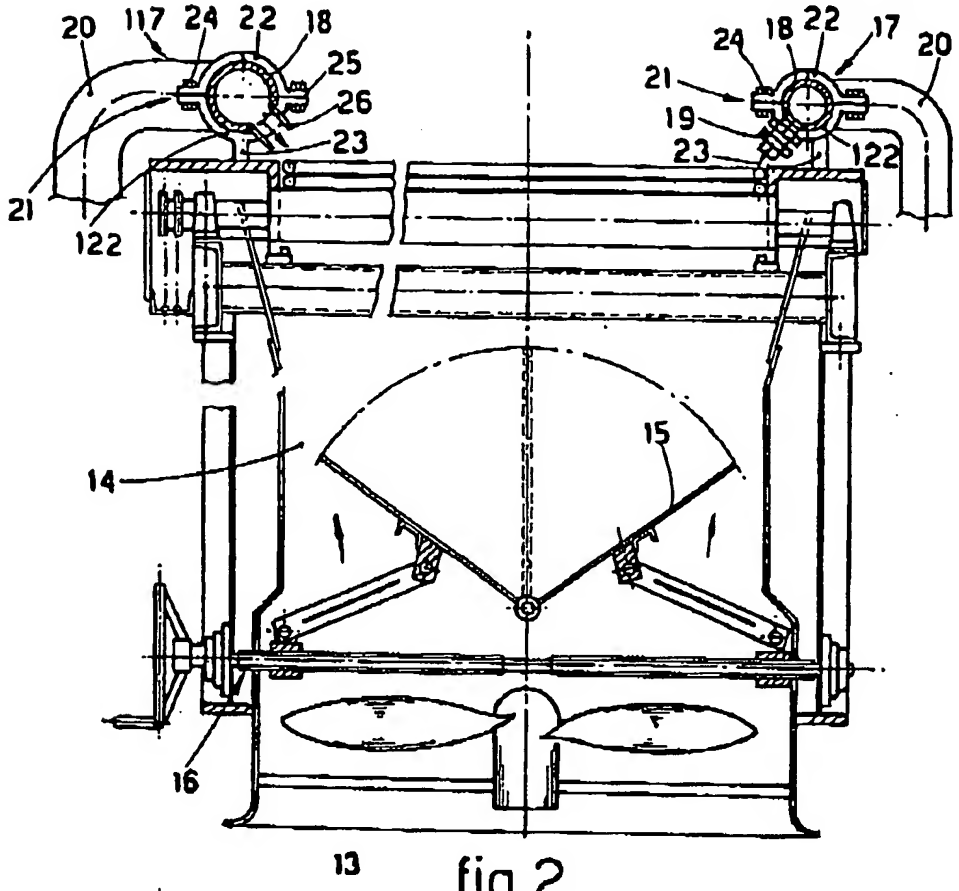

fig.2

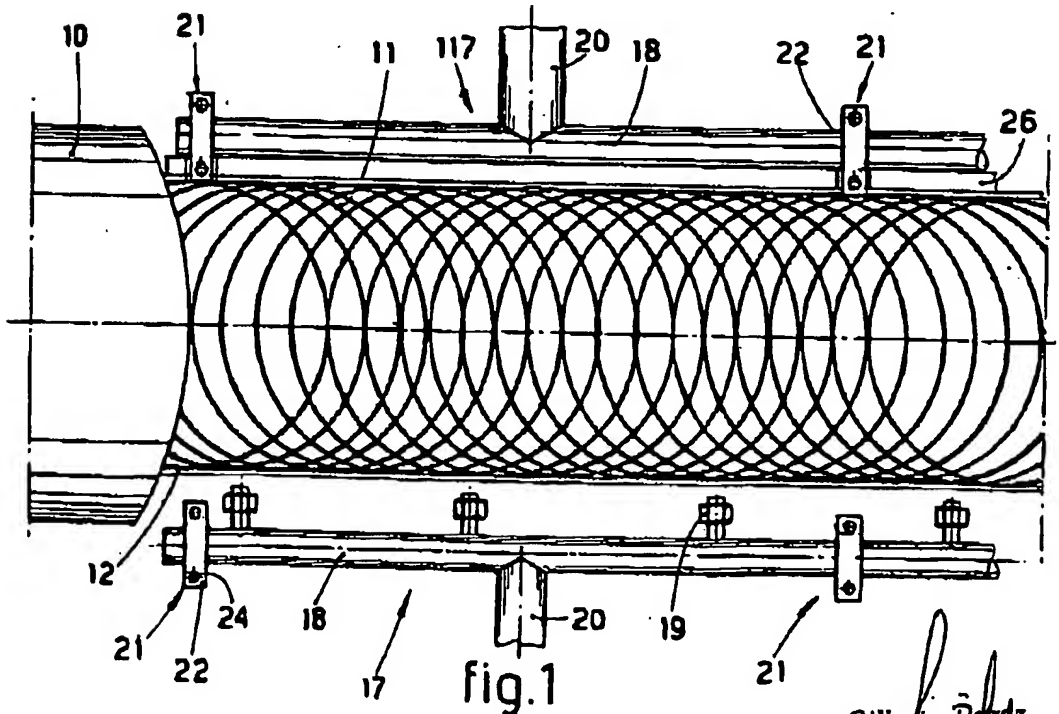

fig.1

Gilbert Perez